

# High-definition Image collection by Field Monitoring System and Image Processing Application

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In this presentation, we introduce a field monitoring system that collects plant images from agricultural fields and a Web high-definition image viewer as an application of the monitoring system. Plant growth stages and signs of disease are often provided color changes on the plant surface. For this reason, collected high-definition images can be compared with reference images, or analyzed detailed surface colors over time in order to extract information about the growth state. We have been conducting outdoor observations since 2009 and collected high-definition images mainly on fruit trees such as grapes, apples, chestnuts, and pears. An originally developed monitoring system automatically controls a single-lens reflex camera and captures images of the field every hour. The captured images are collected on a server through mobile communication. Since images taken with a single-lens reflex camera are large and difficult to handle, the server automatically generates about 5,000 pyramid-structured images from one image whenever the images are saved on the server. We developed a Web application to quickly access to all collected images. The Web application has a function of adding annotations on images and generates training data for deep learning. We developed a system to automatically detect apple fruit regions from field images and extract its size information. The Web application also has a function to easily share annotations added to images on SNS such as Facebook and Twitter. Annotators can share information among their annotations and progress. General users can also add annotation on images and such activities will increase metadata for collected images. I would like to widely discuss the applicability and possibility of the developed system.

Keywords: Field Monitoring, High-definition Image, IoT, Deep Learning